SECTION H

THE REAR AXLE

GENERAL DESCRIPTION

The rear axle is of the semi-floating type. It is of unit construction, and no repairs or adjustments apart from those connected with the half-shafts and rear wheel bearings, brake-drums and shoe mechanism can be carried out without removing the complete axle unit from the car.

The rear wheel bearing outer races are carried in an extension of the rear axle casing and the inner races bear directly on the axle half-shafts. The wheel hubs are attached to the axle shafts by splines and a tapered split collar.

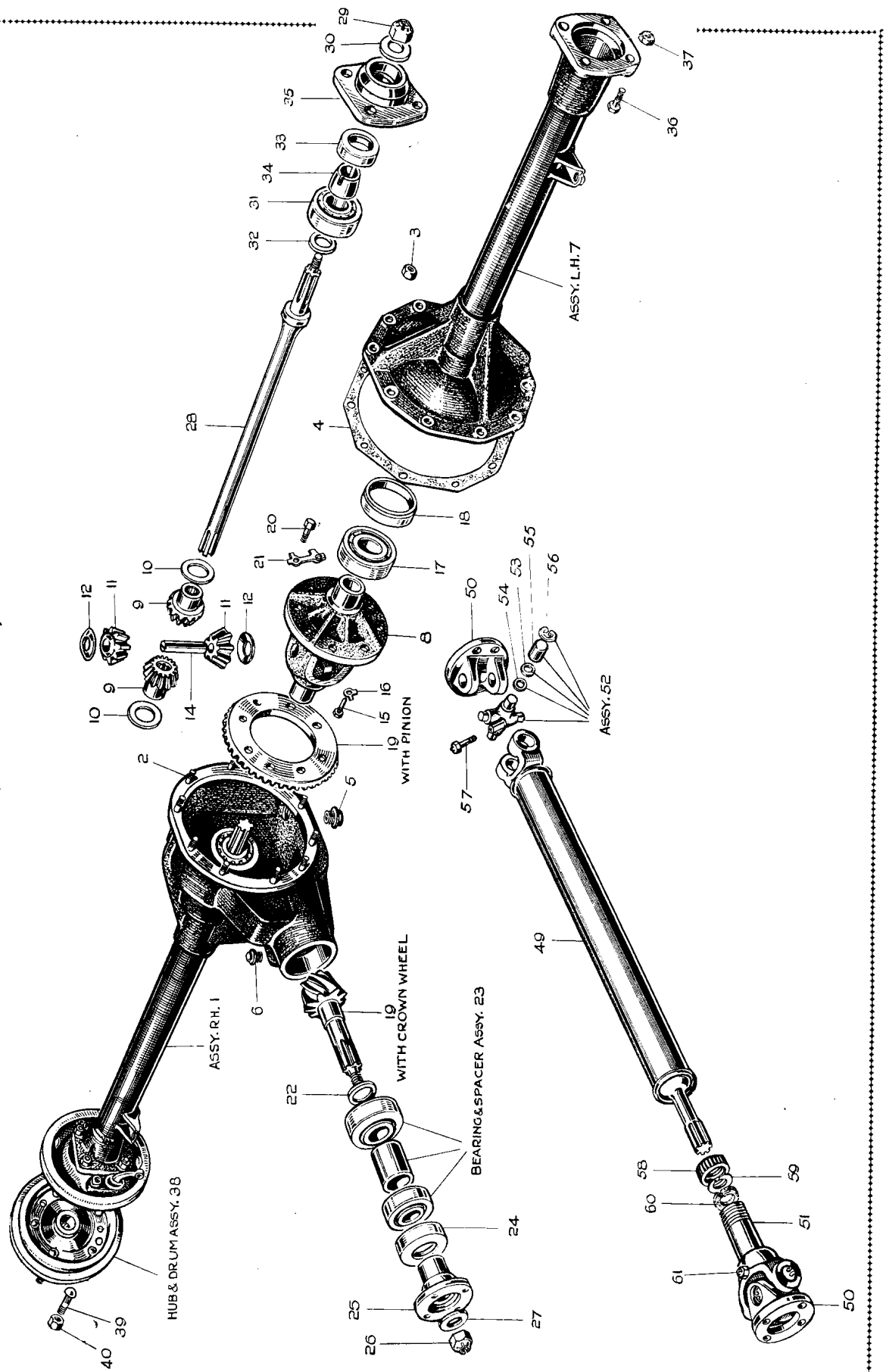
Contrary to previous M.G. practice, the axle half-shafts can only be withdrawn after removing the wheel, wheel hub and brake-drum, brake back plate assembly and the wheel bearing housing.

The brake-drums are of cast iron integral with the hub or permanently attached to the wheel hub flanges by countersunk-headed screws, **which must not be disturbed.**

Hypoid-type final reduction gears are used and the axle housing is divided close to its centre for assembly purposes, the pinion assembly being mounted in the right-hand half or axle casing.

THE REAR AXLE AND PROPELLER SHAFT COMPONENTS

(Series "TD")



KEY TO THE REAR AXLE AND PROPELLER SHAFT COMPONENTS

No.	Description
1.	Axle tube assembly—R/H.
2.	Stud—cover.
3.	Nut—axle cover stud.
4.	Joint.
5.	Drain plug.
6.	Oil filler plug.
7.	Axle tube assembly—L/H.
8.	Cage—differential.
9.	Gear—differential.
10.	Washer—gear.
11.	Pinion—differential.
12.	Washer—pinion.
14.	Pin—pinion.
15.	Locking bolt—pinion pin.
16.	Tab washer—locking bolt.
17.	Bearing—differential.
18.	Distance collar—bearing.
19.	Crown wheel and pinion.
20.	Bolt—crown wheel.
21.	Locking tab—crown wheel bolt.
22.	Distance washer—pinion—rear.
23.	Bearing and spacer assembly.
24.	Oil seal—pinion—front.
25.	Flange—universal joint.
26.	Castle nut—pinion.
27.	Washer—castle nut.
28.	Rear axle shaft.
29.	Nut—axle shaft.
30.	Washer—axle shaft nut.
31.	Bearing—rear hub.
32.	Distance washer—hub bearing.
33.	Oil seal—hub.
34.	Collar—oil seal.
35.	Support—brake plate.
36.	Bolt for support.
37.	Nut—$\frac{3}{8}$ in. B.S.F. (Philidas).
38.	Hub and brake-drum assembly.
39.	Wheel stud.
40.	Nut—wheel stud.
49.	Tubular shaft assembly.
50.	Flange yoke.
51.	Sleeve yoke assembly.
52.	Journal assembly less greaser.
53.	Gasket—journal.
54.	Retainer—gasket.
55.	Needle bearing assembly.
56.	Snap ring.
57.	Grease nipple.
58.	Dust cap.
59.	Steel washer.
60.	Cork washer.
61.	Grease nipple.

The bearings of the differential and crown wheel assembly are carried in recesses machined in the axle casing and cover, which are bolted together, and, since no inspection apertures are provided, **all adjustments have to be carried out by pre-measurement in conjunction with special gauges.**

Adjustment of the position of both the crown wheel and the pinion in the axle is effected by distance-pieces, which are selected on initial assembly, and there is no other provision for adjustments. The crown wheel and pinions are only supplied in pairs as heretofore.

The use of Hypoid gears enables a much larger pinion to be used, providing more silent running and a greatly increased life.

The rear brake gear is of the normal two-shoe type, operated hydraulically from the brake pedal and also mechanically by hand-operated mechanism actuating

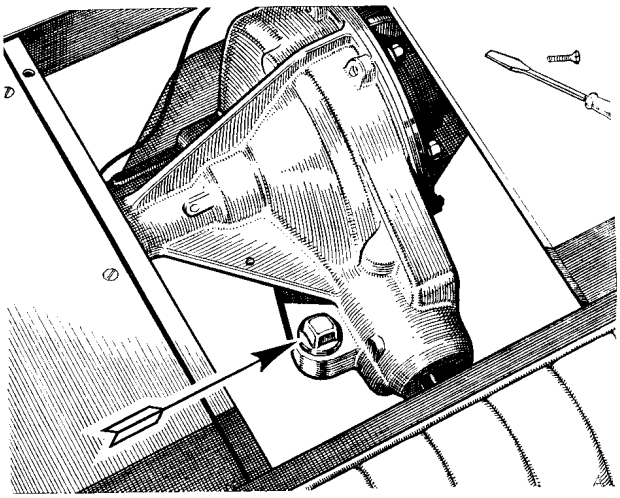


Fig. H.1.
Access to the rear axle oil filler is achieved through the opening behind the rear seat exposed when the floor is lifted.

the same shoes. The operating cylinder for the shoes is mounted vertically on the brake plates and acts directly on the brake-shoes.

Adjustment is by means of a serrated snail cam with screwdriver operation through holes in the brake-drum disc.

Suspension is by means of semi-elliptic leaf springs with rubber interleaving and rubber mounting. The shackles and the spring anchorage are both fitted with flexing rubber bushes needing no lubrication.

LUBRICATION

Oil is introduced to the axle through a filler plug on the right-hand side of the pinion housing. When replenishing or refilling, the level of the oil should not be raised above the lip of the filling aperture.

It is of the utmost importance that only HYPOID oils of the approved grades and manufacture be employed if satisfactory service is to be obtained from the Hypoid gears.

Inspect the oil level every 1,000 miles (1600 km.) and replenish if necessary to the level of the filler opening with one of the Hypoid oils recommended on page P.2.

After the first 500 miles (800 km.) and subsequently every 6,000 miles (10000 km.) drain off the old oil and refill with new.

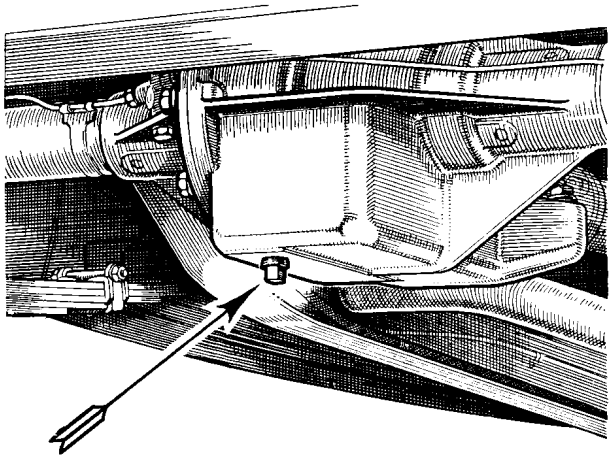


Fig. H.2.
The rear axle drain plug is situated in the base of the axle casing.

The drain plug is underneath the rear end of the axle casing. The capacity of the axle is 2¼ pints (1·3 litres).

Lubrication of the rear hub bearings is achieved automatically from the main oil supply and no provision is made for any other attention.

Section H.1

REMOVING AND REPLACING THE BRAKE-DRUM AND HUB

The brake-drums are permanently attached to the wheel hubs by countersunk-headed screws, the inner ends of which are riveted over. **These screws should not be disturbed, and if it is necessary to fit a new drum or hub a complete assembly should be used as the hubs and brake-drums are machined after assembly.** On some models the hub and drum are made in one piece.

Jack up the axle so that the wheel to be operated on is clear of the ground and place chocks on either side of the wheels remaining on the ground. **Release the hand brake fully—THIS IS IMPORTANT.**

Remove the road wheel by prising off the hub cover with the flat on the end of the wheel nut spanner, giving the spanner a sideways motion and **not** a radial one. The spanner end should be inserted in the depressions provided adjacent to the studs holding the cover.

Unscrew the wheel stud nuts and withdraw wheel.

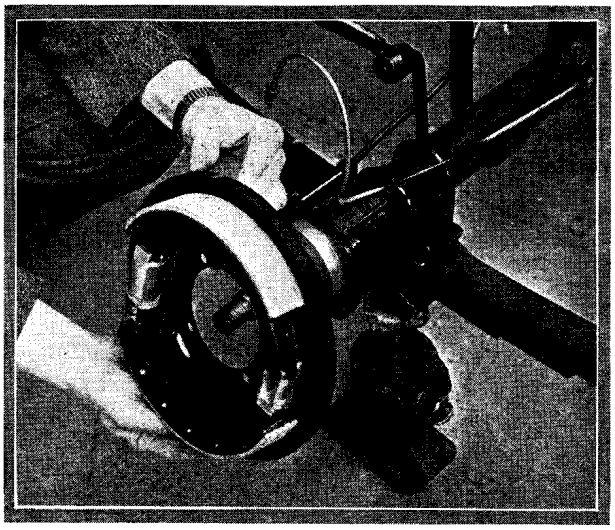


Fig. H.3.
Removing the brake plate assembly from the axle casing flange.

Remove the split pin from the axle nut and unscrew the nut with a set spanner. The axle half-shafts are threaded right-handed on both sides of the car and are therefore interchangeable.

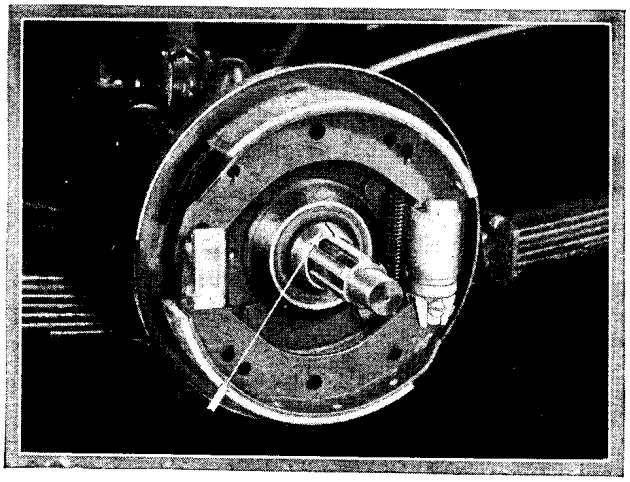


Fig. H.4.
When refitting the rear hubs it is absolutely essential to make sure that the split tapered collar is right home against the ball race.

The wheel hub is locked to the axle half-shaft by means of a tapered split collar in addition to the driving splines. It is therefore to be expected that some resistance will be evident when the extractor is used to free the hub from the taper.

When replacing the rear hub it is essential to make quite sure that the tapered split collar is right home against the inner race of the wheel bearing before any attempt is made to offer up the hub. It is, in fact, advisable to tap the collar lightly into position with a hide hammer, taking the utmost care not to damage it in any way. It is also essential to see that the parallel portion of the collar engaging the oil seal is absolutely free from blemishes before it is replaced and that the oil seal is not damaged in any way.

Section H.2

REMOVAL AND REPLACEMENT OF THE BRAKE PLATE ASSEMBLY

Jack up the axle and remove the wheel as in Section H.1.

See that the hand brake is fully released.

Remove the hub as in Section H.1.

If it is required to remove the brake plate assembly to the bench for attention, the Lockheed pipe should be disconnected, but this is not recommended unless absolutely necessary as it entails bleeding the brakes.

The brake plate assembly is attached to the axle flange by four bolts with the nuts fitted on the inner side of the flange. Removal of the nuts enables the bolts to be withdrawn and the brake plate assembly to be removed.

Reassembly takes place in the reverse order to dismantling, and it is essential to make sure that the retaining nuts are screwed up tight.

Do not forget to bleed the brakes if the pipeline has been disconnected.

Section H.3

REMOVING AND REPLACING A REAR AXLE HALF-SHAFT

Jack up the axle as outlined in Section H.1, or raise the rear of the car with a sling attached to the bumper supports.

Remove the wheel as in Section H.1.

See that the hand brake is fully released.

Remove the hub and brake-drum assembly as in Section H.1.

Remove the brake plate and shoe assembly as in Section H.2.

Withdraw the split collar from the axle half-shaft.

Fit the special tool (Part No. 68823) to the end of the axle shaft and, using the sliding impact weight, release the shaft complete with bearing, housing and oil seal.

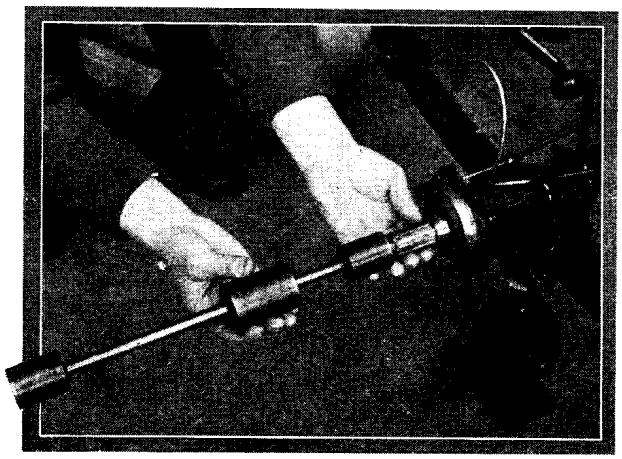


Fig. H.5.
The special impact extractor (Part No. 68823) in use to withdraw the axle shaft and bearing.

The half-shaft can then be pressed out of the bearing.

Reassembling is a reversal of the foregoing.

When replacing an oil seal in the wheel bearing housing see that the sealing edge of the bore is towards the bearing. It should be a good press fit in the axle end cap.

Do not forget to see that the split collar is perfectly clean and free from blemish, particularly on its parallel portion, and pushed well home against the bearing inner race before replacing the wheel hub. It is advisable to tap it lightly into contact with the axle bearing with a hide hammer, taking the utmost care not to damage it in any way in the process.

Section H.4

REMOVING REAR AXLE FROM CAR

Raise rear of car by means of a suitable sling and block up under the chassis just forward of the rear spring front mountings.

Remove both road wheels and release the hand brake.

Disconnect the Lockheed flexible pipe at its junction to the bracket on the chassis.

Disconnect the brake cable casings from their anchorage to the spring brackets by removing the retaining nut and spring washer.

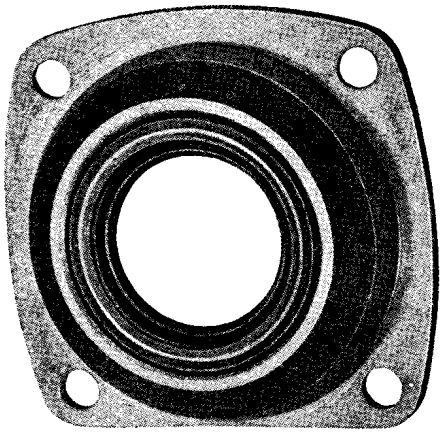


Fig. H.6.
The correct way round for the axle hub oil seal is with its sealing edge facing towards the bearing.

Disconnect the brake cables by removing the clevis pin attaching the forked yoke to the brake-shoe actuating lever on the brake plate.

Disconnect the shock absorber arms at their lower ends.

Mark the propeller shaft coupling flanges so that they are replaced in the same relative positions.

Uncouple the propeller shaft at the rear flange by unscrewing the four coupling nuts and bolts. Support the tail end of the propeller shaft through the aperture in the rear seat giving access to the rear axle oil filler.

Undo all the spring "U" bolt nuts so that the axle rests on the rebound straps. Take the weight of the axle by means of jacks or a suitable axle stand.

Remove the rebound straps, lower the exhaust pipe and the axle can now be withdrawn sideways.

Reassembly is a reversal of the dismantling procedure, but do not forget to bleed the hydraulic brake system after coupling up the flexible hose.

Section H.5

IMPORTANT POINTS CONCERNING AXLE ATTENTION

Attention requiring the dismantling of the axle and the replacement of parts is not advised unless this is absolutely necessary and unless you are equipped with the necessary checking gauges and a full range of distance-pieces and spacers from which to select the required new sizes. The fitting of a replacement axle, when possible, is advised.

Dismantling for examination and cleaning is permissible provided care is taken to refit the distance-pieces and spacers in exactly the same locations.

No adjustment is provided in the accepted sense. The crown wheel and pinion are set in their correct relation to each other by means of distance-pieces and spacers selected to provide the correct location

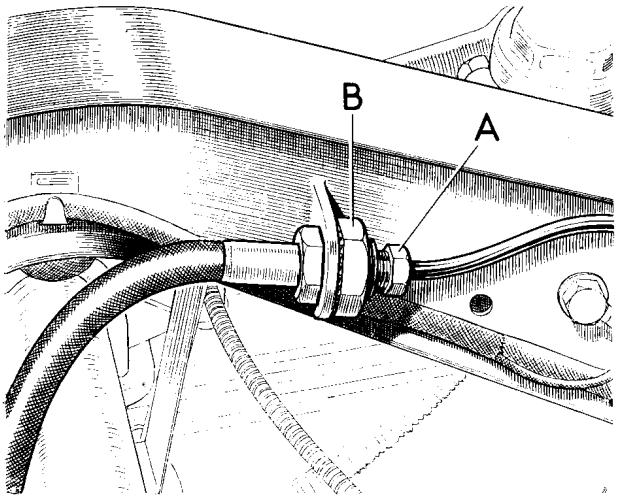


Fig. H.7.
When uncoupling the flexible hose the union nut "A" must first be unscrewed and then the attachment nut "B." On no account must the hexagon on the flexible pipe be turned in an attempt to disengage the flexible coupling.

of the components on initial assembly. Should the components be dismantled, their relative positions should carefully be observed and each part marked suitably so that it can be reassembled correctly in its original position.

Various components can be replaced by correctly combining the markings on the original components against those on the new parts in the manner detailed in subsequent sections.

It is important that the repairer be quite clear on this point before he undertakes the dismantling of the axle.

Spacers between the outer races of the differential bearings and faces of the recesses machined in the axle casing and cover control the position of the crown wheel in relation to the centre line of the pinion.

Adjustment of the pinion position is made by varying the thickness of the pinion washer, and that of the crown wheel by the varying thickness of the differential bearings spacers.

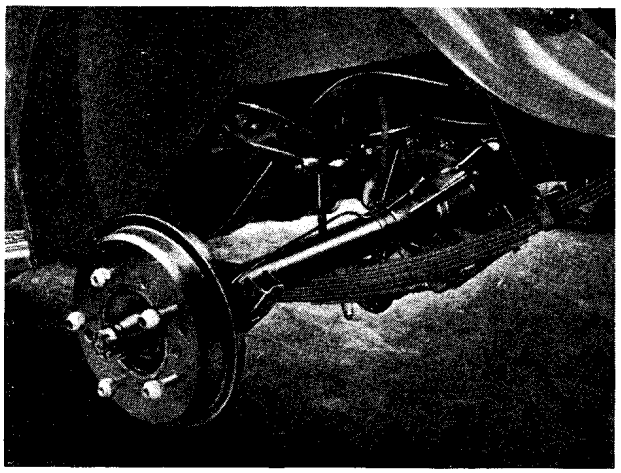


Fig. H.8.
The axle, complete with springs, disconnected from the car and ready for removal.

The following operations are possible without the use of special tools :—

(*a*) To replace a crown wheel and pinion with a pair carrying markings which are identical to the originals.

(*b*) To replace a crown wheel bearing alone, since these are of the controlled width type, provided genuine **M.G.** replacements are used.

(*c*) To replace an axle cover which carries markings identical to the original.

The following replacements are possible by calculations alone :—

(*d*) To replace the differential cage by one carrying a different marking to the original.

(*e*) To replace an axle cover carrying different markings to the original.

The following replacements can be carried out by calculation and the use of special tools :—

(*f*) To replace an axle case carrying different markings to the original.

(*g*) To replace a crown wheel and pinion carrying different markings to the originals.

(*h*) To replace bearings to the pinion shaft.

Operations (*a*), (*b*) and (*c*) merely call for the fitting of the new parts in the positions occupied by the old. The remaining operations entail special precautions and are detailed subsequently.

The axle or half-shafts, rear hub bearings, brake-drums and shoe mechanism can all be dismantled and replaced with the axle in position on the car.

Section H.6

DISMANTLING THE AXLE AND REMOVING THE DIFFERENTIAL ASSEMBLY

Remove the axle from the car as detailed in Section H.4.

To dismantle the axle, first remove the hub and brake-drum assemblies as in Section H.1, and the brake plates as in Section H.2.

Remove the axle half-shafts as detailed in Section H.3.

Remove the series of bolts joining the axle casing and cover together and carefully part them, taking care to see that both halves of the axle are suitably supported to avoid damage to the differential assembly.

The withdrawal of the axle cover from the casing releases the differential and crown wheel assembly, which can now be withdrawn.

Note that spacers are fitted between the differential bearings and the bearing housings and that they are important as they control the position of the differential assembly in the axle.

It is essential that they be replaced in their original locations on assembly, so make a note of the positions from which they are removed.

Note.—*All original spacers are marked o/s and n/s.*

It must also be noted that the axle casing and cover are marked on the surface of one of the outside webs or tubes with one of the following figures :—Zero, 1, 2, 3, 4, 5, 6, all being positive.

Section H.7

DISMANTLING THE DIFFERENTIAL AND CROWN WHEEL ASSEMBLY

When the differential assembly has been removed from the axle casing, as detailed in Section H.6, it is dismantled by bending back the tab of the locking plate of the bolt locating the differential pinion shaft, withdrawing the bolt and removing the shaft.

The differential pinions can now be removed from the differential cage by swinging them round with their dished thrust plates until they register with the openings in the differential cage, through which they can be removed.

The differential cage gears can then be withdrawn from inside the differential through the openings, together with their thrust washers.

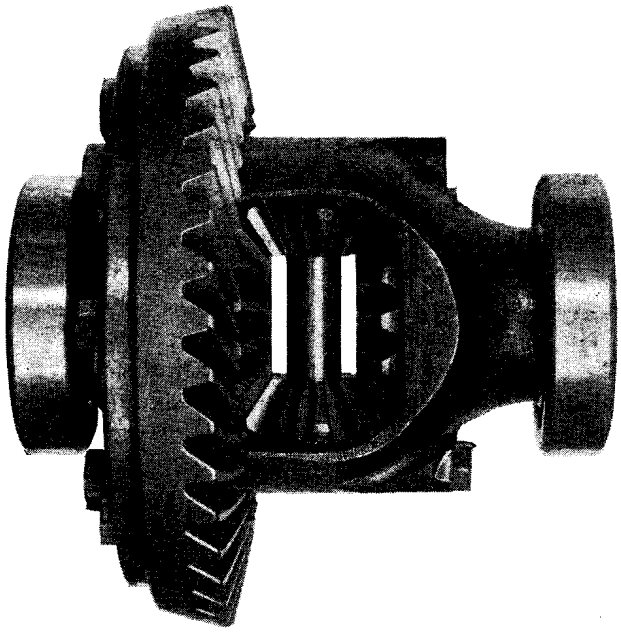


Fig. H.9.
The differential and crown wheel assembly with the ball races in position on the differential cage. The bolt locking the shaft for the differential pinions is clearly seen at the lower right-hand corner of the cage.

The crown wheel is attached to the differential cage by bolts locked by lock plates. Bending back the tabs of the lock plates and removing the bolts releases the crown wheel from the differential cage.

Note.—*The crown wheels are marked on their back faces with one of the following figures : +2, +1, Zero (or no marking), −1, −2.*

Section H.8

EXAMINING PARTS FOR WEAR

Before examination all parts should be cleaned thoroughly.

The crown wheel bearings are of the ball type and should be renewed if necessary. They are controlled dimensionally and must only be replaced by **genuine M.G. replacements.** Failure to observe this instruction will only lead to complications later.

The pinion shaft bearings are of the taper roller type and should be renewed, as a set, complete with distance-piece, if they do not run smoothly on their rollers.

The crown wheel and pinion are lapped in pairs.

It is essential, therefore, that crown wheels and pinions be stored and used in pairs as originally supplied, otherwise satisfactory results cannot be obtained.

If the inner races of the roller bearings are loose on the pinion, check with a new set of bearings, and if these are also loose on the pinion shaft it is an indication that the shaft has worn ; a new crown wheel and pinion should be fitted.

Fractures in the teeth, hollows or any roughness on the surface of the teeth will render both crown wheels and pinions unserviceable.

The axle casing or axle cover (or both) should be renewed if new replacement bearings are not a light drive fit in the bores machined in their housings.

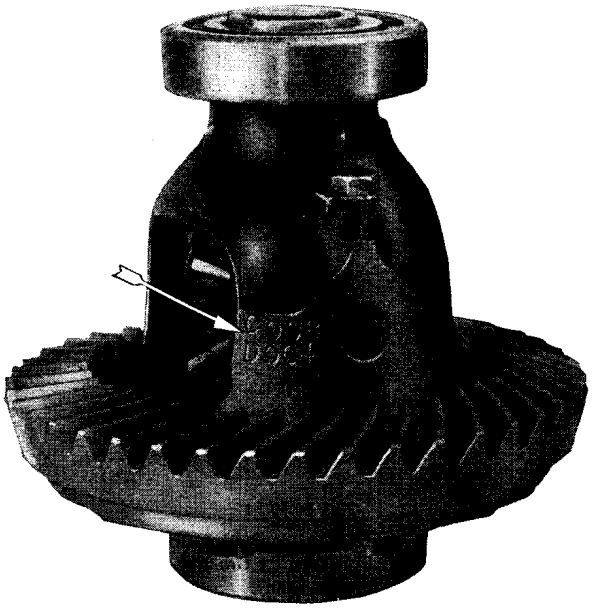


Fig. H.10.
The marking of the differential cage to indicate its assembly dimensions is clearly shown in this illustration, which bears a " C " dimension of ·008 and a " D " dimension of ·004.

Any looseness of the bearings should be overcome by renewing the bearing, the axle cover or axle casing.

The cage should be renewed if there is excessive wear in the bores in which the differential gears revolve.

The oil seals should be renewed if they are not a press fit in the pinion housing or wheel bearing housing, or if their central portion is loose in the outer metal casing, or if the spring is fractured or broken.

The differential gears, pinions and pins should be renewed if there is any doubt about their condition, although more latitude in wear is permissible in these parts without detrimental effects than is the case with the crown wheel and pinion.

Section H.9

TO REPLACE A DIFFERENTIAL CAGE

Selecting an axle casing spacer

All differential cages are stamped with two letters— " C " and " D "—together with a figure. The prefix " C " indicates the dimension over the differential bearings and the dimensional range is from 0 In. to

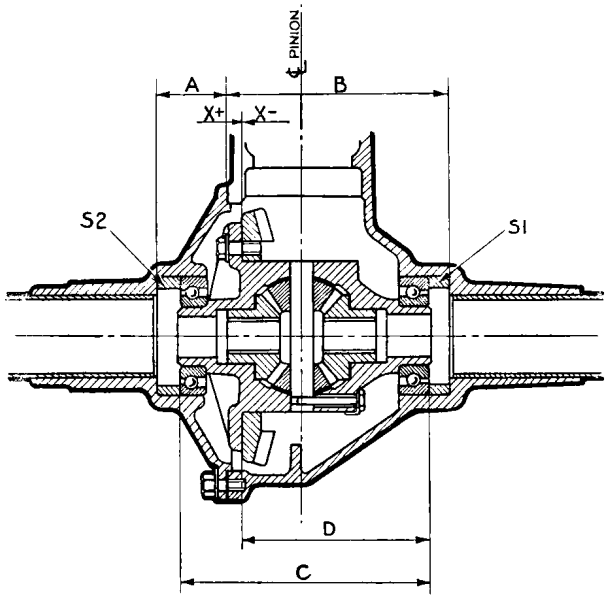


Fig. H.11.
This diagram indicates the significance of the " A," " B," " C " and " D " dimensions.

·012 in. " D " indicates the dimension from the crown wheel back face to the outside face of the right-hand bearing outer race and the range is from 0 in. to +·006 in.

Differential cages can be interchanged by applying the following procedure :—

Balance the " D " dimensions of the two cages and from the result select differential bearing spacers which will produce the same final location of the crown wheel on assembly.

Example (1) If the " D " dimension of the old cage was ·005 in. and the " D " dimension on the new cage is ·002 in., giving a difference of +·003 in., then this difference must be **added** to the old spacer thickness.

That is to say, if the old spacer is marked ·503 in. the new spacer must be ·506 in. thick.

Example (2) If the " D " dimension of the old cage was ·001 in. and the " D " dimension on the new cage is ·005 in., giving a difference of —·004 in., then this difference must be **subtracted** from the original spacer thickness.
That is to say, if the old spacer was ·509 in. thick, then the new spacer must be ·505 in. thick.

Selecting an axle cover spacer

In this case subtract the " D " dimension from the " C " dimension on both the old and the new differential cages.

If the resultant of the dimensions on the new cage is greater than that on the old cage, the new spacer for the axle cover is less than the old one by the difference and vice versa.

Example (1) Old : " C " ·006 in. —" D " ·005 in.
= ·001 in.
New : " C " ·007 in. —" D " ·002 in.
= ·005 in.
The resultant with the new cage is the greater by ·004 in., therefore the new spacer should be ·004 in. **less** in thickness than the old one.

Example (2) Old : " C " ·002 in. —" D " ·001 in.
= ·001 in.
New : " C " ·001 in. —" D " ·005 in.
= —·004 in.
The old resultant is here the greater by ·005 in., therefore the new spacer must be ·005 in. thicker than the old one.

Section H.10

ASSEMBLING THE DIFFERENTIAL AND CROWN WHEEL

The differential is assembled by first inserting the differential gears inside the differential cage with their thrust washers in position.

Note.—*When new washers are fitted it is necessary to see that they are properly bedded in or it may be difficult to insert the pinions.*

The differential pinions are next inserted through the opening of the cage with their distance-pieces and thrust washers. The pinions are then rotated in the cage until they register with the holes in the cage for the shaft.

The pinion spindle, which should be a light push fit in the cage, is then inserted, taking care to line up the locking bolt holes.

Note.—*The slot in the shaft can be used as a guide.*

Fit the locking bolt and turn up the tab of its locking washer.

Fit the crown wheel to the differential cage after making sure that the mating surfaces are perfectly clean and the edges free from burrs.

Check the crown wheel for truth by spinning the assembly on a roller fixture with a dial gauge registering against the outer edge of the crown wheel. The maximum permissible error of alignment is ·001 in. (·025 mm.), and if the figure registered is in excess of this the crown wheel should be removed from the differential cage and the flange of the cage checked for truth. If necessary, fit a replacement cage.

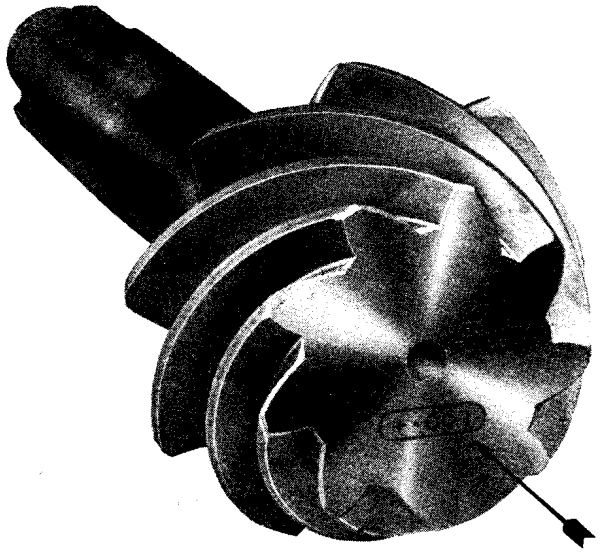


Fig. H.12.
The marking of the pinion to show its dimension for fitting is indicated by the arrow.

Provided the flange is true within the permissible error, clean all parts carefully and reassemble the crown wheel to the cage in a different position to that in which it was first assembled and checked, then re-check. This process should be repeated several times before finally deciding to discard the crown wheel and pinion.

The differential ball races can now be pressed on.

If a new crown wheel or differential cage has been fitted it is essential to measure the " C " dimension over the differential ball races, and the " D " dimension from the crown wheel back face to the right-hand bearing outer race outside face, and inform the Service Department at Abingdon of the change of components, quoting the new dimensions so that the necessary modification can be made to the axle history card for future reference.

Section H.11

TO REPLACE A PINION

(*a*) The old pinion in a new axle casing.
(*b*) New pinion and new matched set of bearings and distance-piece in an old casing.
(*c*) New pinion and old bearings and distance-piece in an old casing.
(*d*) Old pinion and new matched set of bearings and distance-piece in an old casing.

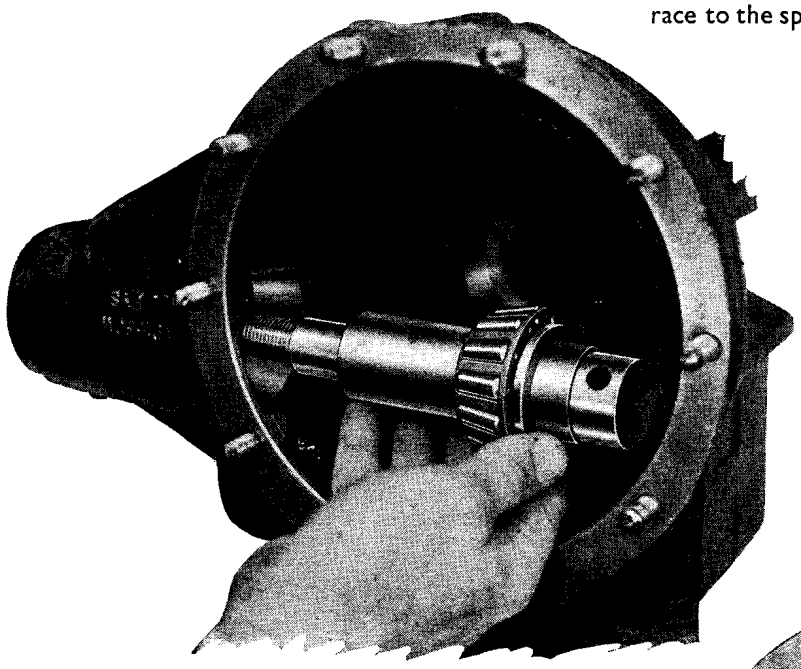


Fig. H.13.
Inserting the special dummy pinion shaft into the axle casing pinion housing.

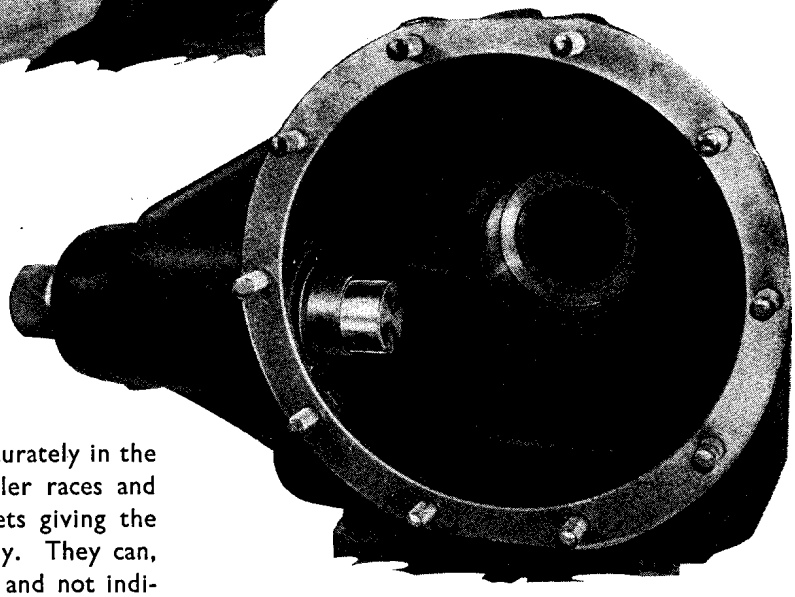


Fig. H.14.
The dummy pinion shaft in position in the housing. The ground head of the dummy shaft forms the datum for establishing the correct thickness for the spacing washer.

In all cases the pinion must be set accurately in the axle casing, remembering that the roller races and their distance-pieces are supplied in sets giving the correct amount of pre-load on assembly. They can, therefore, only be replaced as " sets " and not individually.

The pinions may be marked on their heads with one of the following figures :—

A ringed figure +2, +1, Zero (or no marking), —1, —2, and possibly an unringed figure —2 or —1.

The pinion washer controls the position of the pinion in relation to the axis of the crown wheel, and it is fitted between the head of the pinion and its rear bearing.

Adjustment of the pinion position is made by varying the thickness of the pinion washer. These are available in a range of thickness varying by ·001 in. (·025 mm.) and are marked on spares replacements only.

The pinion is fitted to the axle in the following way :—

Fit the pinion bearing outer races in the pinion housing, then assemble the rear pinion bearing inner race to the special dummy pinion spindle (Special Tool No. 68829), and place in position in the housing, inserting it through the cover opening in the axle casing.

Fit the front bearing inner race.*

Fit the spindle nut and tighten it up to give the correct pre-load of 11 to 13 in./lb. (·126 to ·149 m./kg.)

* NOTE.—The bearing spacer is omitted, because the correct pre-load can only be obtained with the bearing in position when the universal joint flange is locked up tight. This is due to the calculated compression of the bearing spacer under this locking load.

to the bearings. This can be checked by applying the special tool, Part No. 68839. (See Section Q.)

Rotate the spindle eight or ten times to seat the bearings.

Fit the checking fixture (Part No. 68829) in the axle cover opening and make sure that the locating arm makes firm contact with the side of the dummy spindle head. (See Fig. H.15.)

This leaves a gap between the dummy pinion head and the checking anvil of the fixture, and this is the actual thickness of the pinion washer required for a standard pinion or one that has no marking.

Select a washer which will just slide between these faces and fit it behind the pinion head when re-assembling.

To assist manufacturing conditions it is occasionally necessary that a pinion be assembled away from the standard position. If this is so the variation is marked on the pinion head in a ring such as (+2), the sign + meaning that the centres are increased by ·002 in. Correction has to be made for this, and when the figure is + (plus) the amount must be **taken from** the washer thickness, and if the figure is — (minus) then the amount has to be **added** to the washer thickness.

Fig. H.15.
(*Right*) The special checking fixture for determining the correct spacing washer thickness in position in the axle casing. Note that its locating tongue is making contact with the head of the dummy pinion spindle.

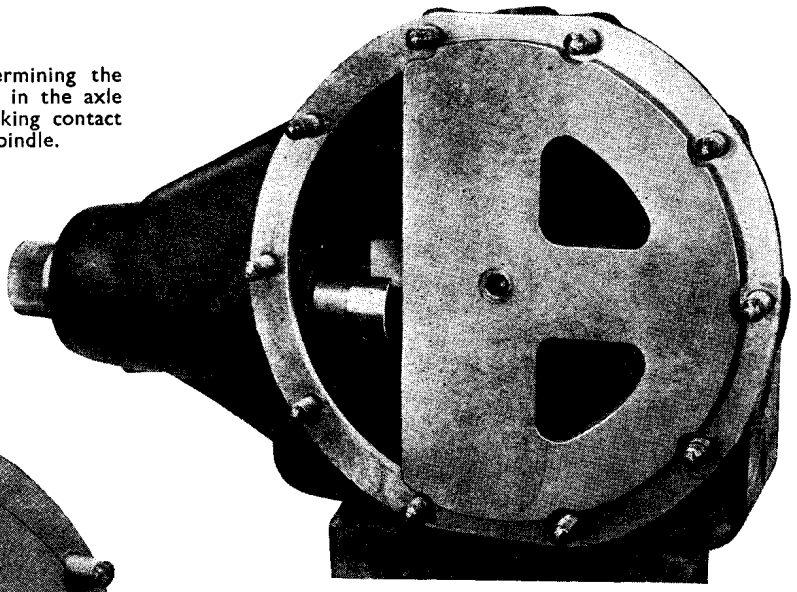
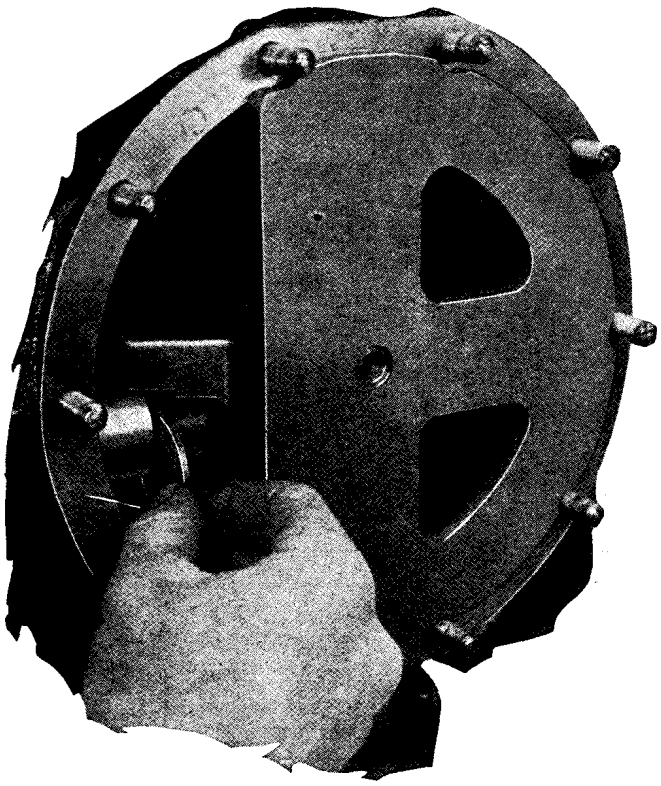


Fig. H.16.
(*Below*) When the locating tongue of the special checking fixture is in contact with the head of the dummy pinion spindle the space between the head of the spindle and the anvil of the checking fixture determines the thickness of the pinion spacing washer.



Example (*a*) A washer fitting the gap of the dummy pinion with a marking of ·127 must be replaced by a washer having the marking ·129 when refitting a pinion with the marking —2 or —·002.

Example (*b*) A washer fitting the gap of the dummy pinion and bearing the marking ·127 must be replaced by a washer marked ·125 when the pinion is marked +2 or +·002 on its head.

A plain or unringed figure may be marked on the pinion head in addition to a ringed figure, but this is only an indication of the variation of the pinion head thickness from standard and is always minus. It has no bearing on the pinion setting.

When the correct spacing washer has been decided upon the actual pinion assembly can take place, **but the importance of making the measurements correctly must be appreciated, since it is impossible to check the adjustment when the axle is assembled.**

The actual pinion assembly is carried out by threading the special pinion washer just selected on the pinion shaft, bevelled side against the pinion, and pressing on the rear roller bearing inner race with its projecting side against the washer. This sub-assembly is then inserted into the casing through the axle cover opening and located in position in the pinion housing of the axle casing.

The distance-piece and forward roller bearing inner race are next passed on to the pinion shaft, with the projecting side of the inner race facing forward. These components are followed by the pinion flange with its retaining washer and nut. Tighten up the nut firmly.

Rotate the pinion, using special tool, Part No. 68839, to ascertain that the correct degree of pre-load is present. The pinion should present the same resistance to rotation as was evident when using the special dummy spindle, namely 11 to 13 in./lb. (·126 to ·149 m./kg.).

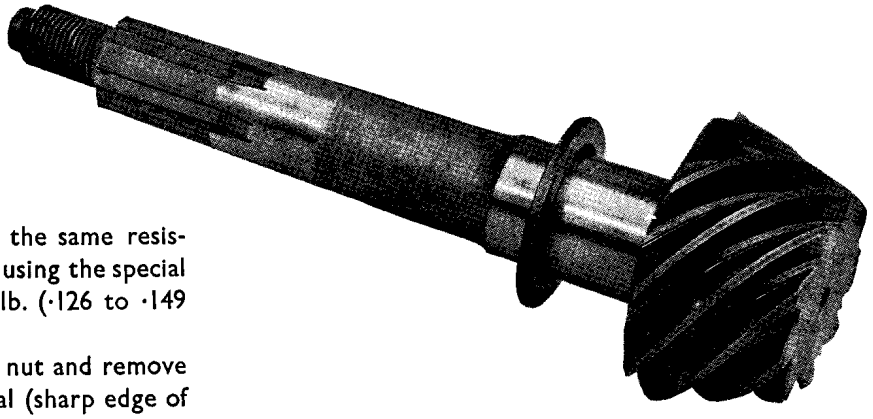


Fig. H.17.
The pinion and pinion spacing washer. Note that the bevelled side of the washer bore should be against the pinion.

If the pre-load is correct, undo the nut and remove the washer and flange ; fit the oil seal (sharp edge of the bore towards bearing), replace the pinion flange, retaining washer and nut.

If the pre-load is not correct the distance-piece and bearing assembly will have to be replaced by the selection process until the correct pre-load is obtained.

Finally tighten up the nut and fit the split pin.

Section H.12

TO FIT A NEW AXLE CASING

When a new axle case is being fitted it is necessary to refit the pinion as detailed in Section H.11, and select a new distance collar for the differential bearing in the manner here indicated.

Compensation for variations in the depth of the differential bearing bores is made by taking note of the markings on the old and new axle casings. For example :—

If the old casing is +·002 in. and the new one +·004 in., the positive difference ·002 in. is added to the existing differential bearing distance collar. That is to say, if the old distance collar is marked ·505 in., then the required new distance collar is ·507 in.

Similarly, if the old casing is +·005 in. and the new one +·001 in., the resulting difference is negative, —·004 in., and must be subtracted from the bearing distance collar, i.e. if the old distance collar is ·509 in., the required new distance collar is ·505 in.

The distance collars are manufactured in steps of ·001 in. and measurements should therefore be made to the nearest thousandth of an inch.

Section H.13

TO FIT A NEW AXLE HOUSING COVER

When a new axle cover is being fitted it is not necessary to make any adjustment to the pinion.

Compensation must, however, be made for variations in the depth of the differential bearing housing in the same manner as that outlined for the axle casing in Section H.12, and the same calculations for the selection of the required new distance collar for the differential bearings are involved.

Section H.14

TO REPLACE A CROWN WHEEL AND PINION HAVING MARKINGS DIFFERENT FROM THE ORIGINAL

Note.—The crown wheels and pinions are manufactured in matched pairs and are not replaceable individually but only in pairs. The necessity for replacing either a pinion or crown wheel therefore necessitates the fitting of a new pair of components and the operations of fitting a new pinion and a new crown wheel are involved.

The crown wheels are marked on their back faces with one of the following markings : +2, +1, Zero (or no marking), —1 or —2.

Read off the markings from the back face of the old crown wheel and note the difference between this and the marking on the new crown wheel.

For example : If the old one is marked —1 (—·001 in.) and the new one +2 (·002 in.), the dimension difference is +·003 in. To reassemble correctly it is thus necessary to fit a new distance collar in the axle casing which is ·003 in. **thicker** than the old one, and a new one ·003 in. **thinner** than the old one in the axle cover.

Note that the **combined** thicknesses of these distance collars must remain the same.

The setting of the pinion is carried out as indicated in Section H.11.

Section H.15

REASSEMBLING THE AXLE

Provided that no replacement parts are fitted, the assembly of the axle is quite straightforward if proper note is taken of the positions of various distance-pieces, washers and spacers on dismantling, and they are replaced in exactly their original locations.

Assembly of the differential and crown wheel is described in detail in Section H.10.

Assembly of the pinion housing is given in detail in Section H.11.

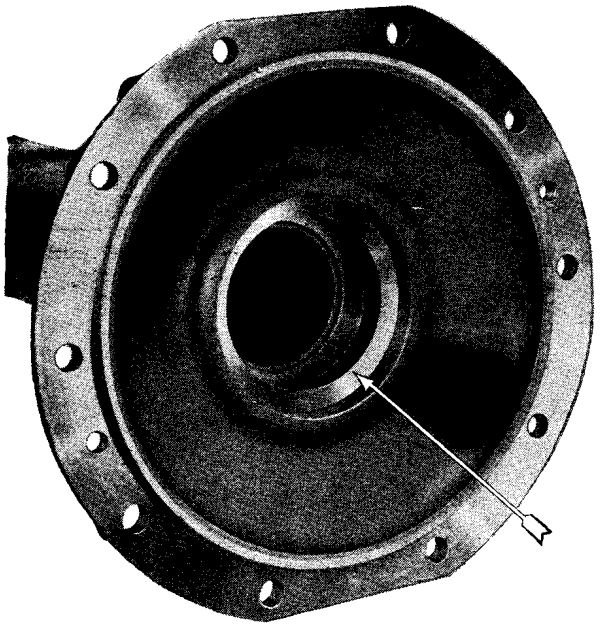


Fig. H.18.
The location of the differential bearing spacer in the axle casing is indicated by the arrow.

The assembly of the axle cover to the axle casing is carried out with a gasket between their joint surfaces. The calculations made for adjustment provide for the thickness of the gasket, but it is important that a genuine M.G. replacement is used. (Thickness of gasket ·005 in. (·125 mm.) when compressed.)

The differential assembly should be assembled in the axle casing, making sure that its bearing in the axle casing is right home in its housing and that a gasket is in position on the joint surface. The axle cover is then placed in position over the axle casing and carefully pushed home till the joint faces are in contact.

The ten nuts fastening the halves of the axle housing together are then screwed lightly in position and

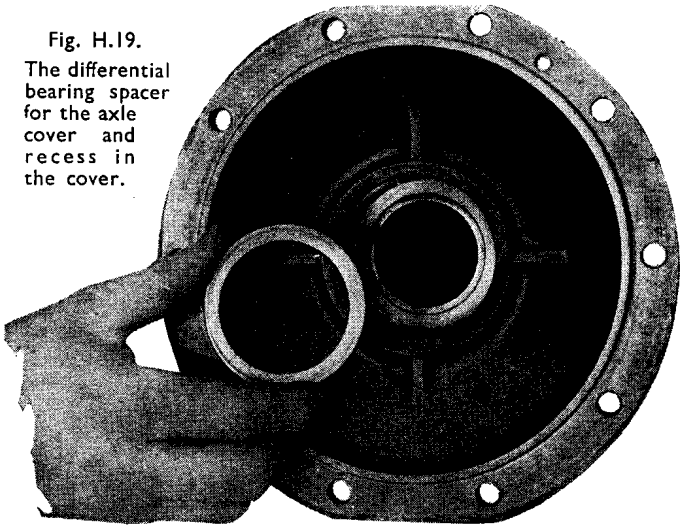


Fig. H.19.
The differential bearing spacer for the axle cover and recess in the cover.

finally tightened up a quarter of a turn at a time in a diagonal sequence to ensure even tightening and absence of distortion.

The brake plates are refitted in the manner described in Section H.2. The axle half-shafts are refitted in the manner described in Section H.3. The hub and brake-drum assemblies are refitted as in Section H.1.

Make sure that the pinion, differential and axle half-shafts are free from undue restriction before replacing the axle in the car.

Section H.16

REFITTING THE REAR AXLE

This is largely a reversal of the removal process, and once the axle has been lifted over the springs it must be carefully positioned before the "U" bolts are tightened.

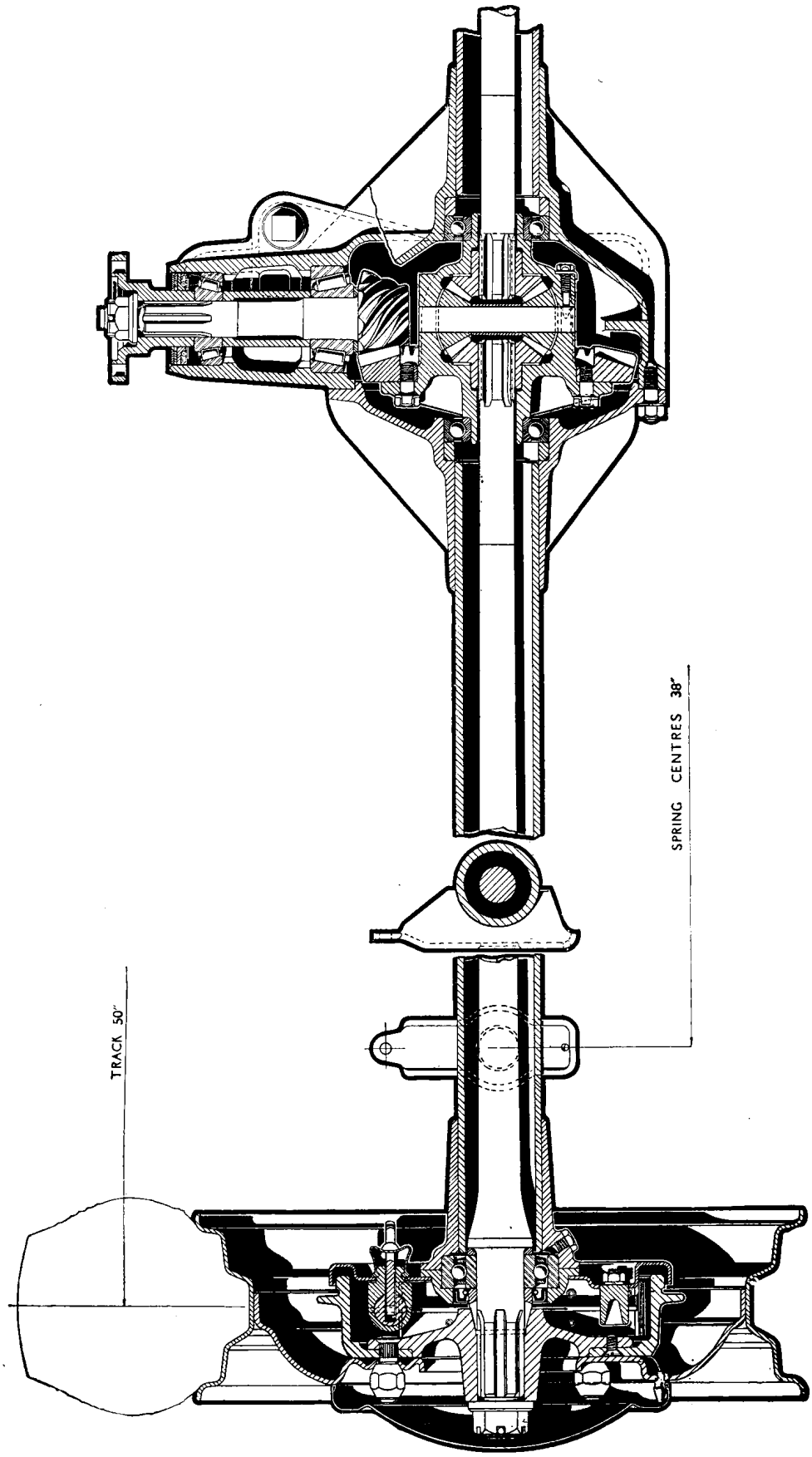
Jack up the axle and connect the propeller shaft, making sure the self-locking nuts are quite tight.

Next re-connect the rebound straps and the hand brake cables.

Fit the shock absorbers to their brackets and connect up the brake hoses.

Finally bleed the brake system as explained in Section M.

THE M.G. MIDGET (Series "TD") REAR AXLE



Section H.17

IDENTIFICATION OF "UNIFIED" SCREW THREADS

The general standardisation of "Unified" screw threads makes it necessary to identify all nuts, bolts, and set screws with these threads in order to ensure their correct use with correspondingly threaded components and the fitting of correct replacements. Later M.G. Midget axles have A.N.F. or "Unified" screw threads.

The "Unified" thread is, however, interchangeable with the American National Fine (A.N.F.) thread for all practical purposes.

As an interim measure, prior to the standardisation of the "Unified" thread, certain of the Hypoid axles fitted to Nuffield vehicles have been manufactured with A.N.F. threaded components, and such axles are identifiable from the fact that they are fitted with wheel stud nuts having the notch-type identification on the corners of the hexagon.

Care must be taken, in the case of these axles, to use the correct nuts, bolts and set screws when reassembling or when fitting new components. With the exception of the wheel nuts (which are notched) there is no identification mark on A.N.F. threaded bolts, nuts, and set screws by which they can be identified readily.

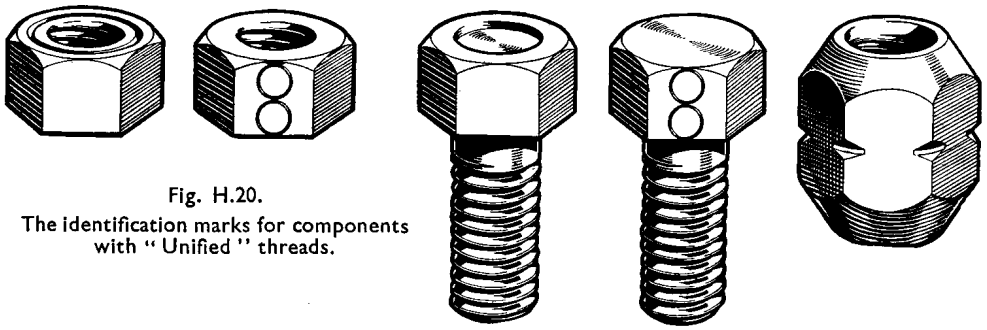


Fig. H.20.
The identification marks for components with "Unified" threads.

Identification has been standardised and is effected in the following manner :—

Nuts. By a circular groove turned on the end face of the nut or by connected circles stamped on one flat of the hexagon.

Bolts and Set Screws. By a circular depression turned on the head or by connected circles stamped on one flat of the hexagon.

Wheel Stud Nuts. By a notch cut in all the corners of the hexagon.

These identification marks are clearly shown in the illustration above and it is obviously of the utmost importance that any nuts, bolts, or set screws so marked are used only in conjunction with their associated components having "Unified" threads and that only replacement parts with "Unified" threads are used, as these are *not* interchangeable with Whitworth, B.S.F. or Metric threads.

Components and assemblies which have "Unified" threads or A.N.F. threads will be identifiable by the new part numbers which have been allocated to them.

Certain service parts supplied with B.S.F. threads will bear no part numbers.

Thus—Assemblies with the old part numbers or without part numbers have B.S.F. threads.
Assemblies with the new part numbers have "Unified" threads or A.N.F. threads.

Spanners. It is to be noted that all A.N.F. and "Unified" threaded nuts and hexagon-headed bolts are made to the standard American hexagon sizes and that spanners of the appropriate size must be used when tightening or loosening them.

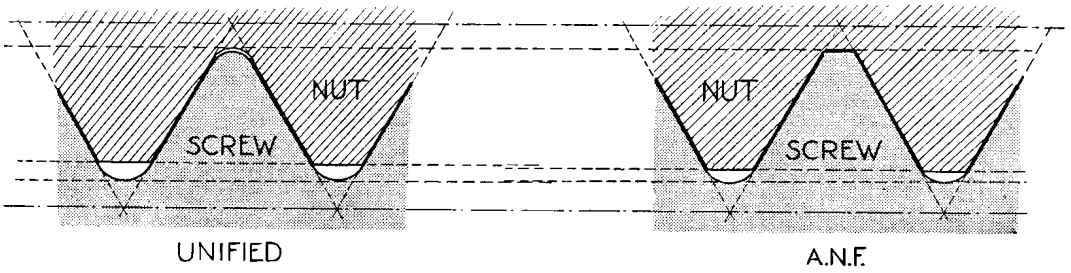


Fig. H.21.
This illustration of the "Unified" thread and A.N.F. thread to the same scale indicates their close relationship.

KEY TO SPANNER SIZES

Nominal widths between jaws

Nuffield Standards	*Diameter of Screw Thread (inches)*									
	$\frac{1}{4}$"	$\frac{5}{16}$"	$\frac{3}{8}$"	$\frac{7}{16}$"	$\frac{1}{2}$"	$\frac{9}{16}$"	$\frac{5}{8}$"	$\frac{3}{4}$"	$\frac{7}{8}$"	1"
For B.S.F. screws and nuts	·448	·529	·604	·705	·825	·925	1·016	1·207	1·309	1·489
For A.N.F. screws and nuts	·440	·504	·566	·629	·755	·880	·944	1·132	1·320	1·508
For " Unified " screws	·440	·504	·566	**·630**	·755	**·817**	·943	1·132	1·321	1·509
For " Unified " nuts (normal)	·440	·504	·566	**·692**	·755	**·880**	·943	1·132	1·321	1·509
For " Unified " nuts (heavy)	—	—	—	—	—	—	**1·069**	**1·258**	**1·446**	—

NOTE.—In the case of some " Unified " threaded components the size of the hexagon for the nut is different from that of the bolt. Where this occurs the spanner size is shown in heavy type in the above table.

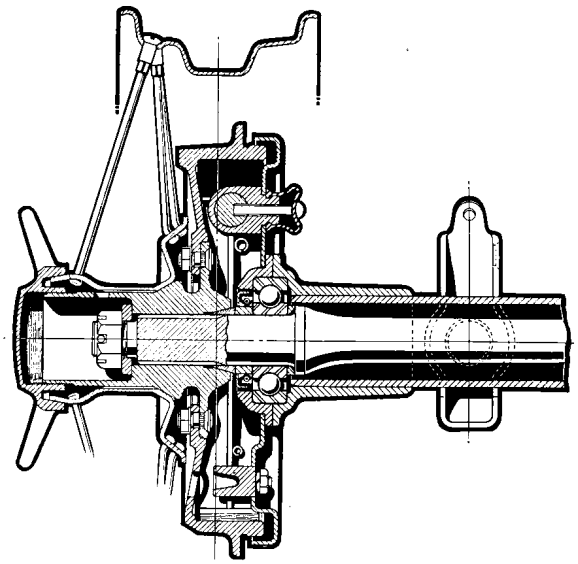
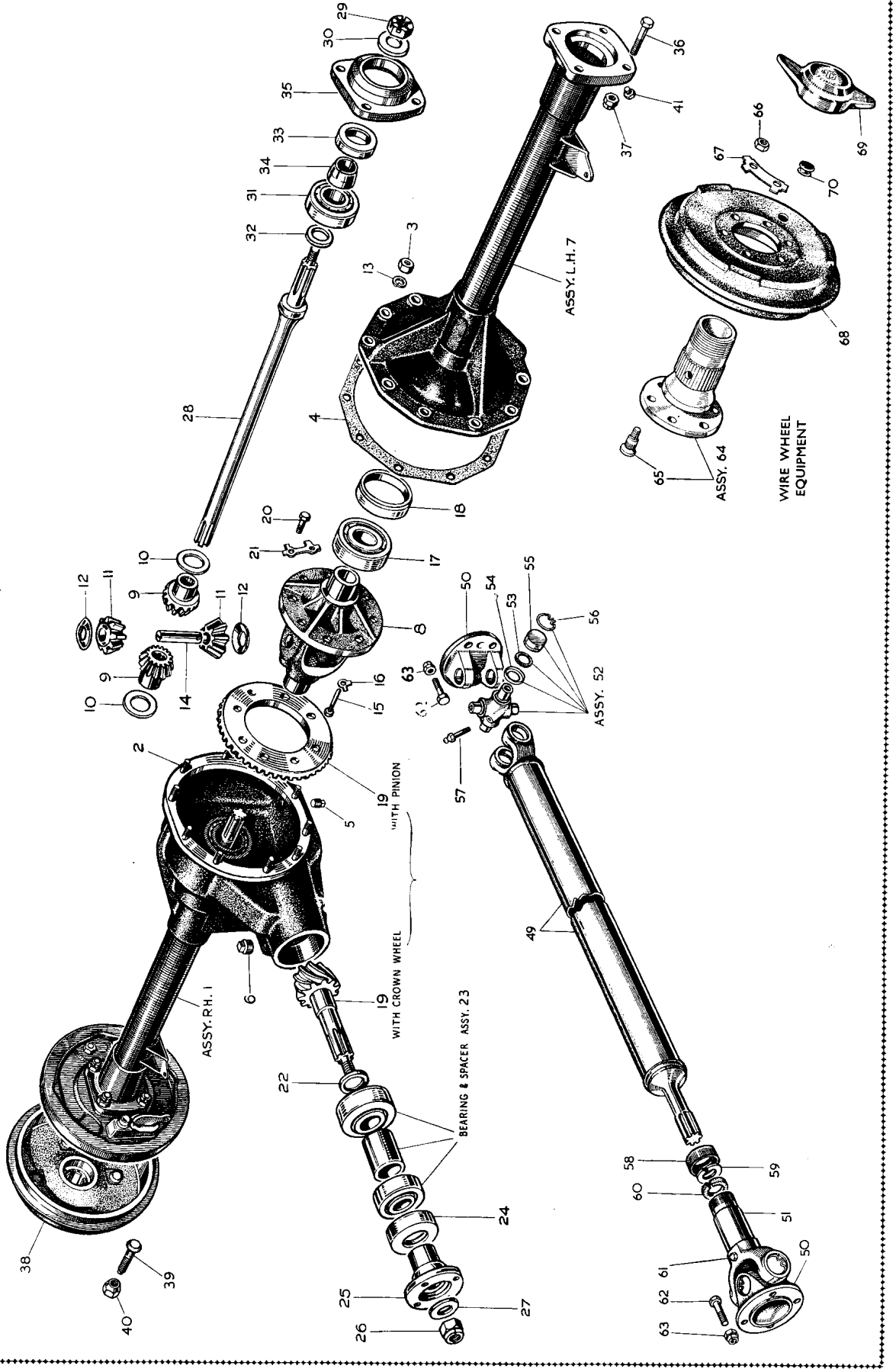


Fig. H.22.
The arrangement of the rear hub and brake-drum on Series "**TF**" cars fitted with detachable wire wheels.

THE REAR AXLE AND PROPELLER SHAFT COMPONENTS

(Series "TF")



KEY TO THE REAR AXLE AND PROPELLER SHAFT COMPONENTS

No.	Description
1.	Axle tube assembly—R/H.
2.	Stud—cover.
3.	Nut—axle cover stud.
4.	Joint.
5.	Drain plug.
6.	Oil filler plug.
7.	Axle tube assembly—L/H.
8.	Cage—differential.
9.	Gear—differential.
10.	Washer—gear.
11.	Pinion—differential.
12.	Washer—pinion.
13.	Washer—cover stud.
14.	Pin—pinion.
15.	Locking bolt—pinion pin.
16.	Tab washer—locking bolt.
17.	Bearing—differential.
18.	Distance collar—bearing.
19.	Crown wheel and pinion.
20.	Bolt—crown wheel.
21.	Locking tab—crown wheel bolt.
22.	Distance washer—pinion—rear.
23.	Bearing and spacer assembly.
24.	Oil seal—pinion—front.
25.	Flange—universal joint.
26.	Castle nut—pinion.
27.	Washer—castle nut.
28.	Rear axle shaft.
29.	Nut—axle shaft.
30.	Washer—axle shaft nut.
31.	Bearing—rear hub.
32.	Distance washer—hub bearing.
33.	Oil seal—hub.
34.	Collar—oil seal.
35.	Support—brake plate.
36.	Bolt for support.
37.	Nut.
38.	Hub and brake-drum assembly. (Disc wheels.)
39.	Wheel stud. (Disc wheels.)
40.	Nut—wheel stud. (Disc wheels.)
41.	Grease plug—axle tube.
49.	Tubular shaft assembly.
50.	Flange yoke.
51.	Sleeve yoke assembly.
52.	Journal assembly less greaser.
53.	Gasket—journal.
54.	Retainer—gasket.
55.	Needle bearing assembly.
56.	Snap ring.
57.	Grease nipple.
58.	Dust cap.
59.	Steel washer.
60.	Cork washer.
61.	Grease nipple.
62.	Bolt—coupling.
63.	Nut—coupling bolt.
64.	Hub assembly—L/H. (Wire wheels.)
65.	Stud—hub. (Wire wheels.)
66.	Nut—hub. (Wire wheels.)
67.	Locking tab. (Wire wheels.)
68.	Brake-drum. (Wire wheels.)
69.	Hub cap—L/H. (Wire wheels.)
70.	Plug—rubber. (Wire wheels.)